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(19)(CA) **CANADIAN PATENT** (12)

(54) Bread Improvers

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ABSTRACT

Cellulase bread improvers e.g., xylanase include an oxidase or peroxidase. The mixture may be incorporated in flour as an additive to dough for bread or other baked dough products e.g. puff pastry.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. Bread improver composition comprising effective amounts of cellulase, and peroxidase.

2. Composition according to claim 1 in which the cellulase comprises xylanase.

3. Composition according to claim 1 in which the composition also comprises an effective amount of an oxidase.

4. Composition according to claim 3 in which the oxidase is glucose oxidase.

5. Composition according to claim 1 in which the composition also comprises a sugar.

6. Composition according to claim 5 wherein the composition comprises glucose as the sugar.

7. Flour composition incorporating a bread improver composition which contains effective amounts of cellulase to achieve substantially maximum specific volume and oxidase an/or peroxidase to inhibit disadvantageous effects of the cellulase.

8. Composition according to claim 7 comprising at least 1 ppm of oxidase and/or peroxidase.

9. Flour composition according to claim 7 wherein the flour also contains 0.05 - 5 wt% of added sugar.

10. Composition according to claim 9, wherein the flour contains 0,1 - 2 wt% of added glucose.

11. Dough composition containing a flour composition claimed in claim 7.

12. Baked goods whenever prepared from dough as claimed in claim 11.

13. Process for improving bread and like bakers goods baked from dough which comprises incorporating into the dough bread an improver comprising effective amounts of cellulase to improve specific volume and effective amounts of oxidase and/or peroxidase to inhibit disadvantageous effects of the cellulase, and a sugar.

14. Use a mixture of cellulase, oxidase and a sugar in food, characterised by the fact, that the mixture is used as bread improver.

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BREAD IMPROVERS

This invention relates to additives for improving baked goods, particularly bread improvers, based on cellulolytic enzymes.

The term cellulolytic enzyme is generic for enzymes degrading cellulose. Examples of such enzymes are enzymes, that catalyze the hydrolysis of hexosepolymers such as cellulases and those, that catalyze the hydrolysis of pentose-polymers such as arabino-xylans, xylanases, arabinases and so forth. The addition to dough from which bakers goods are baked of such enzymes, usually in the commercial preparation as a mixture of several enzymes, provides improving effects such as increase in specific volume, anti-staling improvement in crumb structure.

Although the addition of cellulolytic enzymes to bread is not permitted in various countries, they are in many cases present in the bread, because the amylases, which are permitted additives in bread making, contain these enzymes.

The presence of cellulolytic enzyme for example cellulase in alpha amylase comprising the active ingredient in a variety of enzyme-based bread improvers, gives rise to undesired side effects at higher concentrations used to provide these improvements in the greatest degree. In particular dough strength is reduced. The present invention proposes to overcome the disadvantage provided by the presence of cellulase in bread improver formulations by the inclusion of sufficient glucose oxidase and or peroxidase to inhibit its disadvantageous effects.

The invention may be applied as an additive with xylanase providing a mixture with other ingredients to be incorporated in dough for bread making or for example in puff pastry dough.

The use of glucose oxidase as a bread additive has been already proposed in the form of ascorbic acid and/or reductic acid admixed with a glucose-oxidase-containing preparation together with inert fillers, to improve the baking qualities of flour and dough, the glucose-oxidase being extracted for instance from moulds such as A. niger, described in British patent 787,225. More recently, dough conditioners are described in USP 3392030 comprising dehydro forms of enediols of 3-ketoglycosides optionally admixed with glucose-oxidase to provide bread improver compositions, the glucose-oxidase providing for the preparation in situ of H_2O_2.

Food compositions such as dehydrated egg products, cereals and the like may be stabilised according to USP 2744017, by the addition of glucose oxidase to effect the removal of glucose, the presence of free oxygen to effect the enzymatic conversion of the aldose being provided by the inclusion of catalase together with a continuous addition of hydrogen peroxide.

Glucose oxidase is added together with cystine and catalase to bread dough according to a method for improving the quality of bread described in JP 57086235 and JP 57058844 and a comparison is made with the effect of adding calcium bromate and ascorbic acid, according to JP 57047434.

The effect of lipoxygenase and glucose oxidase on the rheological properties of dough are described in the abstract of the International Congress of Food Science and Technology (1978), page 235.

USP 3512992 describes an enzyme additive having pentosanase activity to improve resistance to staling, catalase being present to improve whiteness. German patent 2227368 also describes enzyme additives containing amylase, protease and pentosanase.

According to USP 3934040 an additive for standard doughs comprises cysteine ascorbic acid and fungal enzymes e.g. alpha amylase, protease, etc.

DE 26 15 392 describes a baking improver additive comprising cysteine, and ascorbic acid which may also contain hydrolase enzymes e.g. carbohydrase or amylase.

Netherlands Patent 8401771 describes improving baking flours by increasing the enzyme activities of amylase, glucanase and xylanase in malt added to the flour.

In an article of P. Huhtanen c.s. in J. of Agricult.Sc. in Finland vol. 57 (1985) 284-292 the use of a mixture of cellulase and glucose oxidase as silage additive is described.

The ratio of glucose oxidase or peroxidase to xylanase in bread improver compositions according to the present invention is not critical but the amount of glucose oxidase or peroxidase is preferably more than 1 ppm by weight of flour, preferably 1 to 10 ppm. 1 ppm corresponds with 125 units per mg. glucose oxidase or 210 purpurogallin units per mg peroxidase. The amount of additive expressed as final concentration on flour that may be used is preferably from 50 to 500 parts per million. Sufficient xylanase is preferably present to produce substantially maximum effect on specific volume.

The compositions contains preferably a sugar, in particular glucose as substrate for the glucose oxidase. Therefore the flour composition normally contains 0.05 - 5 wt% added sugar, preferably 0.1-2 wt% of added glucose.

The mixture of xylanase and glucose oxidase or peroxidase may be included in a bread improver composition containing further components, for example fat, additional enzymes, oxidising or reducing agents, sugars, emulsifiers,

thickeners or gums and soya flour may be included. Additional enzymes may be included e.g. amylases, proteases, phospholipases and lipoxygenases.

EXAMPLE

A series of tests were conducted to compare the influence of glucose oxidase and horseradish peroxidase with xylanase on the stability of bread dough, prepared according to the following recipe: -

	Parts by weight
Wheat Flour	100
Yeast (compressed)	5
Water	58
Salt	2
Glucose	0.5 (substrate glucose oxidase)

The dough was mixed over 25 minutes in an Artofex mixer at 27°C. First and second proofs were conducted after 10 minutes each, with a final proof at 45 to 60 minutes. Bread rolls were prepared by baking the dough for 20 minutes at 240° C.

A series of samples were prepared as follows:

Sample		
A	xylanase 200 ppm	
B	xylanase 200 ppm	Glucose oxidase 1 ppm
C	xylanase 200 ppm	Glucose oxidase 2 ppm
D	xylanase 200 ppm	Horse Radish peroxidase 1 ppm
E	xylanase 200 ppm	Horse Radish peroxidase 2 ppm
Blank		

Both the dough and the baked rolls were tested. Results appear in the accompanying Table.

Dough property after mixing was soft and dry for all samples except the Blank which was tough and dry. After

moulding, slight stickiness on the surface of the dough was observed only with the xylanase control (A) and the test with 1 ppm oxidase (B).

Dough softness was also exhibited after moulding by these two products, the remaining tests all being firm except for the blank which was tough.

The best stability was exhibited with the sample containing 2 ppm oxidase with the xylanase and this sample after baking also exhibited a more regular structure, better specific volumes and appearance for both final proof times than the remaining tests. In conclusion this sample has in all respects improved dough properties over the remainder.

PERFORMANCE

Results on dough
Times of sampling

	Property	A	B	C	D	E	Blank
Directly after mixing	Workability	+	+	++	+	+	-
(Kneading)	Elasticity	+	+	++	+	+	-
Directly after molding	Stickiness	-	-	+	+	+	+
	Softness -	-	-	+	+	+	-
Transport to oven	Stability	-	-	++	-	+	ND

Results on product

Crust color	+	+	+	+	+	-
Structure	-	-	+	-	-	-
Volume (45')	5.31	5.24	5.35	5.10	5.17	4.03
Volume (60")	4.86	4.73	4.87	4.57	4.64	3.58
Appearance (45')	7	7	9	7	8	5
Appearance (60")	4	4	6	5	5	2

SUBSTITUTE

REMPLACEMENT

SECTION is not Present

Cette Section est Absente